SYMONS'S
MONTHLY
METEOROLOGICAL MAGAZINE.

CXI.] APRIL, 1875. [PRICE FOURPENCE or 5s. per ann. post free,

REDIER'S BAROGRAPH.

THE instrumental and observational parts of meteorology are leaving the reductional and thinking parts far behind. Years ago the difficulty was to get instruments worthy of mental labour being devoted to the discussion of their results; now the reverse is the case, and there is a great tendency to amass piles of automatic records in the (generally vain) hope that some day or other they will be discussed. At the same time we have not the least wish to dissuade those who can afford it from providing themselves with self-recording apparatus, because though (unless they work up their own results) ninety-nine sheets out of every hundred will be merely a pleasure for a time and never looked at afterwards, yet the other sheet may be of the very highest scientific value. These points are so obvious that it can hardly be necessary to enlarge upon or to prove them.

The apparatus which has led to these remarks is, however, less open to them than most others, because it is (1) simple and easy to manage, (2) because there is no other element the autograph record of which is of more importance, and yet, (3) the cost is not large considering the quality of the work, which is that of high class clock makers.

We will first explain the engraving, and then say a few words, based on a careful examination of the instrument at Messrs Redier & Co.'s Factories*, also when in operation in the rooms of the Société Météorologique, and also of the diagrams produced by it during several months.

First then as to the explanation.

A.—A long but *extremely* light arm, hinged at its right hand end, resting upon F., and terminating in a small ratchet.

BB.—An ordinary syphon barometer tube.

CC.—The slab carrying the same.

E.—An escapement always in operation and tending to draw K. towards itself, and also to raise CC. and, therefore, also BB.

F.—A light float upon which the arm A. rests.

H.—The recording paper, which may be either arranged to be changed each three days, or for a period limited only by the length of the paper.

K.—The registering pencil.

M.—Winding screw for the train driving the escapement E.

N.—Winding screw for the train driving the escapement V.

O.—A little tapper driven by the movement R.

*Cour des Petites-Écuries 8, Paris.

P.—A pulley which turns as the slab CC. is raised or lowered, and which, therefore, compels K. to indicate every change.
Q.—Counterpoise to keep the chain from K. to P. tight.
R.—Clock movement driving the paper-covered cylinder.
R′.—Clock movement driving the tapper O. at intervals.
V.—A fly of which the speed is at least twice that of the escapement E.
XX.—Binding screws working in slots in CC.
Y.—The prime mover driven by a differential train (invisible) and working the axis of P. and the toothed wheel which raises or lowers CC. and BB.

The special features of this instrument are twofold; (1) the trouble, uncertainty, and expense of photographic registration are avoided; (2) the barometric column has scarcely any work to do, simply to support the light arm A, which only weighs a few grains; all the hard work, such as the friction of the pencil on the paper, is born by the clock movements.

For the benefit of such of our readers as may not have realized the precise mode of action from the engraving and from the detailed explanation of each part, we will conclude with a free translation of the description drawn up by M. Louis Redier (who, by the bye, is one of the Vice-Secrétaires of the Société Météorologique).

The motive force of any barometer whatever ordinary size one may give to the apparatus is only sufficient to lift a light needle, and will not overcome the friction of a pencil upon paper. If, however, we so arrange the apparatus that all the work is done by a powerful clock movement, and the barometer has only to direct the action of the clockwork, then it is evident that there is no limit to the work which can be done.

In the instrument under notice this is the case :—An ordinary syphon barometer BB is fixed to the slab CC and supported by the two buttons XX. A small ivory float (F) rests on the mercury and carries a very light vertical needle, on the top of which rests a very light arm (A) which has a small ratchet at its end.

By the side of the apparatus are two clock movements, one (M) terminates in the chronometer escapement E, and the other (N) in the fly V. These two movements work in opposite directions, and are so calculated that the speed of V is at least twice that of E.

A differential train unites this double system with the pulley P, to the axis of which a cog-wheel is attached, which works in a rack on the barometer slab CC.

Now let us assume that the movements are wound up—what will occur? The escapement E is constantly going and tends to draw the pulley and the pencil K, and to raise the barometer and its slab upwards; the arm A pushed by the needle F follows the movement, when the ratchet releases the fly V, and allows it to revolve. The speed of V being twice that of E, the movement N immediately brings the barometer down again until the fly is again arrested by the arm.

These small successive movements are, of course, followed by the pencil, and thus we have a straight line if the barometer is stationary, and one varying right or left according as the column rises or falls.

On the other side of the barometer are two other movements, one (R) driving the paper-covered cylinder, the other (R′) driving a small tapping apparatus to overcome any capillarity in the barometer.

If desired, an arm of any required length can be attached to the pulley P, and it will then act as a wheel barometer.

We have not had an opportunity of testing the instrument ourselves, but from an examination of the curves we incline to believe that (excepting only the desperately expensive King's barograph) it is much the best non-photographic barometer yet known. This, however, is

only an impression, and we think it essential that strict comparison should be made.

The scale adopted is five-fold the natural scale, so that one barometric inch is represented by five inches on the diagram, but this is entirely optional and varies with the circumference of the wheel P.

VAN RYSSELBERGHE'S METEOROGRAPH.

[Although the article of which the following is an abbreviated translation, is skittish rather than scientific in its character, and (as is usually the case in controversial matters) errs in the excess of local partizanship, we think that there are a sufficient number of good points and home thrusts in it to justify us in appropriating to it the limited space into which (by the use of small type, and by abbreviating the translation) we have compressed it. The original occupies more than two columns of *L'Echo de l'Ostend*, March 28, 1875.—Ed.]

We reproduce *in extenso* an article which appeared on Monday last, in *L'Echo du Parlement*, in reply to the Scientific *feuilleton* of the same Journal of March 8th.

SAVANTS AND JURIES,

Irritabile genus!

Horace Ode x.

La Science se meurt!

La Science est morte!

in Belgium be it understood, for the article which appeared lately in our columns (let us say by M. D. to avoid periphrasis) has not extended to other countries the demonstration of this lugubrious theorem.

The theorem rests, moreover, on a lemma, which we will enunciate together with the demonstration, so that all may do justice to the last fragment of pure science in Belgium.

Lemma: *The Jury charged with awarding the quinquennial prize for the Physical and Mathematical Sciences have proved themselves guilty of cliqueism, of partiality, and incompetency.*

Yes.

(Here the names of the jury, seven of the most eminent men in Belgium, are set out).

Yes; they are all incompetent, all negligent, all partial!!!

And now let us give the demonstration.

I.—Their great fault is that they have not mentioned an exclusively physiological work by Prof. Delbœuf, although they have called attention to certain physical facts contained in an analogous work by Prof. Doeg.

II.—The Jury believing, doubtless, that two well-chosen words are preferable to a long sentence, have only devoted 6 lines to some works, but have given 8½ to others. M. D. evidently considers, on the contrary, that the appreciation of a work is measurable by the amount of paper occupied in praising it.

III.—The Jury profaning the worship due to pure science, has degraded itself by taking up the name of an obscure labourer, equally mortal and unknown!

In truth, wherewith does this new comer occupy himself, whom M. D. inveighs against from the height of his science?

Meteorology, Meteorography, study of the tides; mere trifles which have nothing in common with science. True, Euler, d'Alembert, Bernouilli, Lalande, and Laplace, occupied themselves therewith, the last with tidal questions and even observations during 43 years; true, Lubbock and Whewell devoted their lives to this insignificant subject, followed, in our own day, by such unknown men as Airy, Thomson, Sabine, &c. True, also, that Jelinek, Lamont, Secchi, Wild,

Wheatstone, and many others have laboured at Meteorography, what does it matter, the whole is of no moment.

Tell us the mode of reproduction of eels! there is a grand theme! there is a subject worthy of a really lofty genius!

But, alas! where are the Platonic worshippers of Minerva? the poor goddess languishes forsaken! and we her last faithful subjects! cover ourselves with ashes and weep! . . . .

Pleurer! car la science se meurt!
Pleurons! la science est morte!!

* * * * * *

After the *Thesis* let us see the *Antithesis*, and let us remark that the great body of scientific men have not always shared M. D.'s superb contempt for the mixed sciences.

I.—In 1860 the *Académie des Sciences* of Paris awarded the great prize to M. Giffard, the inventor of the miserable injector for locomotives, the author of a mere *improvement* in the feeding of boilers.

II.—The programme of the Geographical Congress to be held in Paris, next August, includes the study of "tide races," phenomena of which M. Van Rysselberghe gave a very plausible explanation at last year's Congress at Lille.

III.—The Scientific Society of Haarlem has, at its meetings during the last four years, repeated the following question, "Find a satisfactory mode of determining the temperature, pressure, &c., at a great height above the earth's surface, and automatically recording the same." This is only a special form of the problem theoretically and practically solved by M. Van Rysselberghe, and his solution must be very satisfactory, since the permanent secretary of the society has thought fit to appropriate our countryman's idea, and to announce it as his own to all Europe, after subjecting it to some disguises equally unhappy and indispensable.

It is by comparing simultaneous observations from numerous stations that meteorologists hope to learn to predict weather changes. Therefore the principal European observatories are in daily telegraphic correspondence, and mutually exchange their 8 a.m. observations. But what of the changes in the intermediate 24 hours. Here we must acknowledge that to the first development of meteorological science, a decided stoppage has succeeded. Now, M. Van Rysselberghe has designed a method whereby it is possible at a single central station to collect and read off momentarily the indications of a series of distant stations, so that when any disturbance arose it would be instantly perceived at the head office, and could be at once telegraphed to the Directors of other systems, who can do the same in exchange. And even if we do not thus arrive at a perfect knowledge of the coming weather, it is only necessary to wait until the astronomers have arrived at the laws of the disturbances of the sun, supreme regulator of the seasons, storms and tempests, as it is the prime cause of all that occurs on the surface of the world submitted to its jurisdiction.

Resuming, however, we may state that M. Van Rysselberghe has thought well, not only to completely solve the question of Meteorography, but—fancy what a mistake for *pure science*—he has not been content to do so theoretically on paper, but has actually had the apparatus made, and intends to study its indications so as thereby to determine the effects of atmospheric changes on the tides. Not only does he propose to establish a Physical Observatory at Ostend, but, also, possibly at other points on the coast! Verily, the enthusiasm of a novice is necessary for such a scheme, and the Government, the town of Ostend, the Royal Academy, the Jury of the Quinquennial Prize, in encouraging the efforts of this obscure young man, have *given to pure science, already so failing among us, a fresh blow, which will certainly hasten its extinction.* For this famous scheme of M. Van Rysselberghe's is as simple as it is fruitful, and his description of it in the Bulletin of the Academy is so modestly written, as to have the air of being of no moment. Yet, strange to say, hardly had these Bulletins been circulated over the Scientific World, ere there set in an ever increasing stream of Directors from the leading Observatories to examine fully the arrangements of M. Van Rysselberghe, and among them have been the Directors of the Observatories of Tiflis,

Utrecht, Montsouris, Puy de Dôme, Vienna, andLisbon, while among the other visitors have been such distinguished men as C. St. Claire Deville, inspector of French Meteorological stations; Balat, member of the Institute; and Carlsen, chief engineer of the Danish Hydrographic service.

If M. D.'s statement that the invention is a mere mechanical improvement had been correct, we much doubt if, to take a single savant as an example, M. Moritz would have undertaken a voyage from the Caucasus to Belgium, with the sole object of studying it.

The opinion of these learned Foreigners ought to have great weight with the writer of the feuilleton of March 8th, who pretends that in future the Belgian Government would do well to choose juries from other nations, since our own savants are decidedly incompetent.

Let him consult then many of the scientific periodicals of Europe, and he will see how the *idea* of our countryman has been received abroad. We may, in conclusion, invoke a single Belgian authority to whom M. D. can hardly object, as he has constituted himself, and rightly so, his warmest defender. M. Gloesner said, in August, 1873, "M. Van Rysselberghe has presented to the Académie a notice of real *scientific value.*"

TRADE WINDS.

To the Editor of the Meteorological Magazine.

SIR,—Maury's hypothesis, that the surface trade-wind of one hemisphere becomes the upper-current return-trade of the other, (Physical Geography of the Sea, sec. 122 to 139) was in all probability originally suggested by the well-known fact, that over the southern portion of the N.E. trade a S.E. upper-current prevails, and over the northern portion of the S.E. trade a N.E. upper-current; though he lays most stress on the arguments which he draws from the greater rainfall of the northern hemisphere (sec. 169 to 186) and from Ehrenberg's examination of the African air-dust (sec. 266 to 296).

A seaman on approaching the Doldrums, commonly notices a current overhead, blowing at an angle of about 90° with the surface trade; he is aware that this upper-current coincides in direction with the trade on the other side of the Doldrums; and that in the calm belt itself, there is an upward motion of the atmosphere. It is, therefore, not unnatural that he should conclude that the upper-current which he observes is a poleward extension of the opposite trade in the higher regions of the atmosphere. It may, also, I think, be admitted that the rapid and suddenly-shifting cloud-currents, often observed over the region of the Doldrums, are somewhat in keeping with Maury's idea of "curdles" or alternate strips of air.

I would suggest that this hypothesis (which many subsequent writers have been surprisingly ready to adopt) may, perhaps, be subjected to a crucial test, if an answer can be given to the following query:—When the S.E. trade draws so far to the north as to be deflected into a S.W. surface-wind, what is the prevalent direction of the upper-current *over the southern portion of the N.E. trade*? If it runs from S.W. it will be difficult to resist the conclusion that Maury is right: if from S.E., it will appear probable that the upper-current is (principally at least) the *N.E. trade*, deflected in the first part of

its return-course, towards the N.W., just as it is in the subsequent part towards the N.E.

Perhaps some meteorologist can give a definite answer to this question. The published data for its solution appear rather scanty; but so far as my own limited information goes, the observations are generally rather adverse to Maury's theory. Those made in the southern half of the squares 40 and 39 (between the parallels of 10° and 15° N. lat., and of 20° and 40° W. long.) in July and August, would be, perhaps, more valuable for this purpose than those from any other parts of the earth's surface. The subject may also be elucidated by analogous observations in the S.E. trade of the Indian Ocean, during the period when the N.W. monsoon prevails to the northward.

Yours truly,

W. CLEMENT LEY.

Ashby Parva, Lutterworth, April 6th.

PROTECTIVE INFLUENCE OF A LAYER OF SNOW AGAINST EXTREMES OF TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—The following thermometer readings may be of interest as illustrating the above.

Two thermometers, (Casella's sensitive forked bulb spirit minimum) one placed on the grass, the other 1 ft. above it, give usually a difference in reading of from 3 to $1\frac{1}{2}$ degrees, the one placed 1 ft. above the grass giving the higher minimum.

During the late severe winter, the readings were reversed, that on the grass (when covered by snow or sleet,) giving a higher minimum than the one above it, as the subjoined readings will show. In order to be sure that the difference was not due to instrumental error, both thermometers were placed in water, which was gradually raised from 32° to 60° F. when their readings were found to coincide for each degree of increase in temperature.

1874.	Thermometer on grass.	Thermometer 1 ft. above grass.	Excess of Thermometer on grass.	
Dec. 17	25	23	+ 2	Covered with snow.
,, 22	17	15	+ 2	do.
,, 23	19	17	+ 2	do.
,, 24	20	$16\frac{1}{2}$	+ $3\frac{1}{2}$	Frozen sleet.
,, 28	23	20	+ 3	do.
,, 29	24	23	+ 1	do.
,, 31	14	13!	+ 1	do.
Jan. 1	14	13	+ 1	do.
Feb. 6	26	23	+ 3	Covered with hoar frost.
,, 20	29	28	+ 1	Covered with snow.
,, 25	30	28	+ 2	do.

Yours, &c.,

EDWARD CHAPMAN.

Magdalen Coll. Laboratory, Oxford, March, 1875.

AMATEUR RAIN GAUGES.

To the Editor of the Meteorological Magazine.

SIR,—Allow me to offer a few remarks in defence of amateur rain gauges, and to point out how, though I do not dispute a single word that you have said against them, they may still be useful in certain cases as pioneers for better ones. Many who probably would become good observers *if once they began*, are deterred from starting by the fear of expense. Before they have acquired by practice the requisite professional enthusiasm, an outlay of one pound is enough to frighten them. Let them, on the other hand, make a rough amateur gauge for a shilling or two, and only *begin* to observe, and the chances are very many that ere a year is over they will buy a good one, having meantime made *experimentum in corpore vili*. This was the case with myself.

Further, since I came out to Greece, I have endeavoured, in a small way, to copy your own example by establishing gauges in various parts of the country. I had to find my men (English or German always, for I have found no Greek requisitely minded)—to induce them to begin at all—and to supply them with instruments. I could not, and they neither could nor would be at the expense of procuring good gauges, neither would I, had I possessed good ones, have risked them on first experiments. What was I to do? I provided myself with some glass tubes from Casella, sealed at one end, had 5 in. funnels of tin made in Patras, which at least were not more than two or three per cent. wrong, graduated the tubes myself by aid of the graduated glass of my own standard gauges, and sent out these *corpora vilia* for the first experiments. I, of course, did not always succeed, but I have I hope fairly set going one station five miles from Patras, at the foot of the mountains, in German hands, and another in Argostoli, the capital of the island of Cephallonia, in the hands of an Englishman, who is taking very kindly to meteorology, and will, I think, procure good instruments, and continue and enlarge his observations after I have left the country.

Surely, then, amateur gauges are not always to be discouraged.

This country possess in its monasteries, scattered about in all kinds of positions and at elevations varying from the sea level to 4000 feet, the means of securing a most complete system of meteorological observations. Alas! no Greek, monk or layman, has hitherto so much as dreamed of anything of the kind.

I remain, yours faithfully,

H. A. BOYS.

Patras, Greece, March 6th, 1875.

METEOROLOGICAL OBSERVATIONS.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps you would allow me as a rather inexperienced observer to state some of the difficulties which I meet, in order to draw from you or your readers any hints that may help at least such as myself.

1.—Schonbein's Ozone Papers. I find the tints of my papers very different from the numbered colours, so different that the two are not easily compared. Again, the papers are often much striped and mottled. In this case am I to take the general effect of the paper, or the deeper colour. Besides it is important to agree with others as to the time after dipping the paper at which we are to note the colour, as it changes a good deal.

2.—Force of Wind. Calculating force from velocity, am I to set down 0 for force till velocity comes up to 3, and then at once begin to set down 1 for force, and so on? or am I to divide midway between the numbers on the Beaufort Scale? I take the average velocity for 12 hours.

3.—Scott's Instructions. The figures in Table II. differ from those I have been using, Buchan's Introductory Meteorology, Table IV., *e.g.* for 800 ft. at 30° Scott gives ·907, while Buchan gives ·893, to be added.

4.—Even Glaisher's Hygrometrical Tables do not always agree with his own Table III., I believe.

5.—Stevenson's Box. The readings often vary a little after a time from what they are on the opening of the box. It would seem that the former are more nearly correct, but for uniformity the reading just after opening is, I suppose, the one to be recorded.

I mention these little differences, because, in point of fact, they are as great as the minor corrections which have to be made, rendering extreme accuracy apparently impossible. I should like, therefore, to hear what more experienced observers do under these circumstances.

I am, &c.,

J. D. P.

March 2nd, 1875.

[We think that the idea of putting such questions as the above through our pages is a good one. These so-called little matters are essential if the observations are to be (as we hold they should be) as good as possible. We do not reply to them because we think it will be better if other observers will favour us with their views, so that the subjects may not drop out of thought at once, but by again coming under the notice of observers obtain the attention which they merit.—ED.]

DAILY RAINFALL.

To the Editor of the Meteorological Magazine.

SIR,—It has struck me that it would be very interesting to many of your readers, if you could find space in your pages, for a *daily* return of the rainfall at Camden Square, especially to those, who like myself, live within a comparatively short distance of it; those of us who send in returns of rainfall to you, would then have an opportunity of comparing such a return from Head Quarters with our own.

Possibly you may be able to act on this suggestion in the future numbers of your Magazine.—I am, Sirs, yours faithfully,

A RAINFALL OBSERVER.

Muswell Hill, Middlesex, N., April 2nd, 1875.

[There are at least two reasons against this proposal. One is the trouble, the other the expense. As to the first, the interest which could attach to the returns of a single station could only be local, we hold, therefore, that if daily values are desired, it is necessary that they should be printed for at least eight stations, say three in England, one in Wales, two in Scotland, and two in Ireland. Assuming (which we know we may do) that the observers whom we may select for this duty volunteer to help, and are punctual, it still leaves to us the extra responsibility of an additional table each month. As to the expense, we need not tell those who are used to English printer's bills, what peculiar ideas are entertained on this side the channel as to the proper charge for tabular matter.

Let us, however, not be misunderstood, neither the trouble nor the extra cost will influence us for a moment if— and this is the crux— if our readers generally think that half a page appropriated to this object would be desirable, interesting, and useful. We are quite ready either to adopt the suggestion or to let it fall through, and await the opinion of our readers.—ED.]

SUPPLEMENTARY TABLE OF RAINFALL IN MARCH, 1875.

[For the Counties, Divisions, Latitudes, and Longitudes of these Stations, see Met. Mag., Vol. X., p. 28.]

Station.	Total Rain.	Station.	Total Rain.
	in.		in.
Acol	·68	Gainford	·84
Hailsham	·78	Shap	2·29
Strathfield Turgiss	·70	Llanfrechfa	2·88
Addington	1·10	Castle Malgwyn	1·46
Oxford	1·09	Heyhope	1·90
Cambridge	·37	Melrose	1·33
Sheering	·54	Cessnock, Glasgow	1·90
Ipswich	·51	Gruinart	1·70
Diss	·66	Keith	1·99
Swaffham	·41	Strathconan	3·09
Compton Bassett	1·08	Springfield, Tain	1·16
Hessary Tor, Dartmoor	4·30	Skibbereen	1·62
Teignmouth	1·30	Fermoy	1·70
Torrington	1·95	Kilrush	1·16
Falmouth		Kilkenny	·91
Taunton	1·24	Kilsallaghan	1·09
Cheadle	·71	Twyford, Athlone	1·02
Ashby de la Zouch	·63	Ballinasloe	1·02
Coston, Melton Mowbray	·70	Kylemore	2·89
Bucknall	·61	Bangor	1·82
Mansfield	·88	Carrick on Shannon	·82
Walton, near Liverpool	·71	Warrenpoint	1·94
Broughton-in-Furness	1·67	Bushmills	1·41
Stanley, Wakefield	·42		

REVIEW.

The Shannon (Flood-relief viâ *Belhavel). A suggestion* by MAJOR CAMPBELL, R.E. Dublin: Alex. Thom, 1874. Folio.

MANY "reports upon" and "surveys of" the Shannon drainage have been made, and they have generally been nearly as long and far more monotonous than the river itself. The present pamphlet is refreshingly bright and vigorous. Major Campbell has also, we believe, proved a true prophet, for, if we are rightly informed, the opening sentence of his pamphlet has been fulfilled to the letter.

"The Shannon Bill of Session 1874 (dealing with about two-thirds of the land liable to floods and half the river's length) will probably fail through the non-assent of two-thirds of the riparian proprietors concerned."

The whole question is, therefore, once more open to consideration, and for that reason we quote a few of the Major's terse paragraphs, and leave them to the consideration of our readers:—

"The floods appear to be simply 'matter misplaced.' They are threatening the neighbourhood of one part while they might be benefiting that of another."

"It is submitted that they might be more effectually controlled by leading the Shannon head-waters straight to Sligo than by any scheme, however skilful, for facilitating their tortuous descent to Limerick. A discharging channel from Lough Allen to Lough Gill (*via* Belhavel) is therefore recommended."

"It is now proposed to apply the remedy to the chief source of the evil, using Lough Allen as a flood-catcher, and giving it vent to the north-west to prevent floods, or to the south to create them, as may from time to time seem advisable."

"The Shannon and *the whole of its tributaries* would be treated as one drainage district; and the Executive near Lough Allen would deal with the sluices in that neighbourhood, as weather, and perhaps, telegrams, showed to be necessary."

"The following points are claimed in support of the scheme:—

"(1). That autumn floods can be prevented, the outfall at Meelick being reducible to five-sixths, or even four-fifths, of its present quantity.

"In spite of Mr. Symons' efforts, few rain-gauges exist in the Shannon basin, but the Loch Awe and Windermere precedents suggest that the rain-fall around Lough Allen may be taken as three times that in the basin discharging at Meelick.

"Cuilcagh, the highest of the mountains near Lough Allen, rises more than 2,000 feet above it; and the crest around the Shannon-source seems a probable place for a second 'Stye.'

"The rain-bearing wind from 'the mournful and misty Atlantic' is here checked for the first time by a cordon of hills."

"(2). That winter floods would be as possible as at present, but could be controlled.

"Experience of the works of 1839 shows that, in some cases at any rate, land was reduced in value by being deprived of winter floods.

"Whatever be the exact source of the benefits the floods cause—whether it be the carbonic acid from bogs, the natural top-dressing precipitated, the mere water itself, or all three—it seems well established, that a moderate degree of winter flooding improves some callows; if, however, the water lies too long, it becomes injurious."

"(3). That so long as floods are prevented, navigation is improved."

"(4). That the water-power on the Shannon will, in some cases, be improved."

"(10). That 3,000 horse-power might be created near Dromohaire."

"(12). That Sligo might be supplied with mountain water.

"A supply of water to Sligo has long been discussed; and the scheme has been to lead it by pipes from a distance of about four miles, at a cost roughly estimated at £25,000.

"For that sum Lough Allen water might probably be led from the out-fall near Dromohaire to Sligo, giving an inexhaustible supply of good water."

THE SEVERITY OF THE WINTER.

(*New York Times, February 16th.*)

People are apt to forget, from one season to another, what manner of weather they have heretofore endured. But though any uncommonly hot or uncommonly cold weather seems "unprecedented," it is generally agreed that this winter has been the most severe of which we have any record, at least for many years past. In almost every locality there are certain indications of extreme cold which are easily compared with those of former years, and these in every case prove the uncommon severity of this winter. In this region, for example, we see an unusual amount of ice in the rivers and bay. Not for a long time has there been so much difficulty in crossing the New Jersey and Long Island ferries. . . .

In the interior the cold has been excessive, the mercury falling to 41° below zero in several parts of this State ; and reports from New England and the North-west indicate a temperature even lower than this. Mercury congealed at Concord, New Hampshire, the other day, and, at several points in the far West, spirits lost fluidity when exposed to the air in an open vessel. Reports from the North Atlantic coast are filled with accounts of suffering and disaster from the extreme cold. Seamen are unable to work their vessels in consequence of the rigging becoming ice-bound, and many craft, coming on the coast, have been put down into the Gulf Stream in order to thaw out the running-rigging. Pilots agree that they have never before seen such hardship and difficulty at sea on account of ice and cold, and several lives have been lost on board vessels shut up by the icy embargo along our shores. Of course this extreme severity of the season is more noticeable in the Middle and Northern States, where the weather—when it is very cold—comes nearer to our ideas of Arctic experience than it does anywhere else in the Republic. But the cold wave or waves—for there have been several of them—seem to have spread all over the country. In regions where frosts are comparatively unknown, the thermometer has ranged very low, and there has been much rain. This is true of several of the Southern and Pacific States ; and invalids, though they have escaped the unusual terrors of this Northern winter, have not found in more favoured regions all the balminess of climate that they expected.

If there be any consolation in the universal companionship of misery and discomfort, we find that solace in reports that reach us from almost every part of the world. Even in the islands of the Pacific, which Herman Melville and others have described as an earthly paradise of bliss, the lightly-clad natives are astonished by low temperatures heretofore unknown. Travellers on the Mediterranean complain of leaden skies and uncomfortable days and nights. Americans visiting in the south of France wrire home dolorous accounts of cold and cheerless hotels, all unprepared for the sudden exigencies of such a winter as this. All over the British Isles, about the beginning of the year, the cold was intense, and the snow, especially in the south of England, was of unprecedented depth. In great country houses, where much merey-making was planned, visitors found great difficulty in keeping comfortable. Even along the north coast of Africa, where one would expect to find a tropical sky, the weather, in December, was said to be unusually cool, and the atmosphere not at all African.

There will be a loud call on scientific men for some explanation of these unwelcome phenomena. Whether the earth is passing through some boreal belt in the universe, or the axis of the globe is changing, the wise men only can tell us. We know that fossil remains in Arctic regions indicate that the equatorial belt was once where "the pole sticks up through the snow," and we believe there are those who predict that the earth will once more revolve at right angles with its present axis, when Quito will be inside the Arctic or Antarctic circle, and Spitzbergen will lie on the equator. What chiefly concerns us now, however, is the effect which this severe winter is having upon our people. In regions where the low temperature has only relative conditions, there need not be much suffering ; though we may suppose that the shivering Kanaka thinks he has fallen upon evil times when it is no longer comfortable to lie naked on the sand. But in our own neighbourhood there is undoubtedly a great deal of suffering among the poor, and a serious increase of mortality among all classes.

UNITED STATES DAILY WEATHER MAPS AND TABLES.

THE United States Government have most liberally sent over a number of copies of the above publication for October and November, 1873, for gratuitous distribution among British Meteorologists. We are authorized by the Director of the Meteorological Office to state that, until the stock is exhausted, he will have copies dispatched to any applicant who forwards to him the cost of postage, viz., one shilling for each of the two volumes. Communications should be addressed "The Director, Meteorological Office, Victoria Street, S.W."

RAINFALL AT LIKNÆS, FLEKKEFJORD, NORWAY,

About 7 Deg. E. Long., and 53·3 Deg. N. Lat. Top of Rain Gauge above Ground, 6 in.; above Sea Level, about 25 ft.? Diameter of Funnel, 5 in.

	1872.				1873.				1874.			
Month.	Total Depth.	Greatest fall in 24 hours.		Days on which ·01 or more fell.	Total Depth.	Greatest fall in 24 hours.		Days on which ·01 or more fell.	Total Depth.	Greatest fall in 24 hours.		Days on which ·01 or more fell.
	in.	depth.	dte.		in.	depth.	dte.		in.	depth.	dte.	
Jan. ...	21·260	..	...	26?	16·780	1·990	18	25	12·385	1·270	12	20
Feb. ...	5·745	2·070	19	14	2·055	·870	25	6	6·530	1·930	27	9
March.	5·010	2·090	28	10	1·970	·960	10	4	3·860	·700	16	10
April ..	2·470	·830	29	8	·950	·530	4	3	5·890	2·080	2	8
May ...	4·272	·500	15	15	3·530	·910	7	10	1·575	·605	30	4
June ...	5·300	·720	13	16	2·781	·620	10	14	2·280	·742	25	8
July ...	1·045	·440	10	7	4·740	·990	13	12	5·104	1·320	22	13
Aug. ..	4·768	1·300	26	11	8·550	1·260	16	23	9·190	1·500	10	14
Sept. ..	15·335	2·060	29	24	9·190	1·340	14	15	11·520	2·140	9	15
Oct. ...	12·460	1·540	30	21	13·065	1·440	19	19	16·840	2·150	6	18
Nov....	14·460	1·990	7	19	7·200	1·450	20	10	3·110	1·930	9	5
Dec. ...	5·225	1·200	7	13	8·230	1·450	15	15	1·720	1·000	4	2
Total ..	97·350			184?	79·041			156	80·004			126

1872.

The Register not begun till 23rd Jan.; the fall from 1–22 Jan. inclusive, is computed from Ex-Consul Jens Beer's register, about 4 English miles off, at 18·74 in.; 27 daily falls above 1 in. Jan., Sept., Oct., and Nov., were considered by the natives *very* wet. In Sept., a wooden bridge was washed away by an unusually high flood; it had not only stood previous floods, but great weights of floating ice after the breaking up of frosts.

1873.

19 daily falls above 1 in. No rain of any consequence from 25th Jan. to 26th July. A partially dry time in early part of December appears to have broken at the same time as the long period of high pressure in England gave way.

1874.

26 days on which upwards of 1 in. fell, and of these, there were 5 days on which upwards of 2 in. fell.

C. O. F. CATAR for BERNT OLSEN.

MARCH, 1875.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date.	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade	No. of Nights below 32°. On grass
			inches	inches.	in.								
I.	ENGLAND.	Camden Town	·69	— 1·39	·28	7	11	59·5	31	27·1	5	12	16
II.		Maidstone (Linton Park)	·92	— 1·57	·28	2	8	62·0	31	26·0	19	17	...
,,		Selborne (The Wakes)	1·30	— 1·30	·69	5	7	56·0	31	27·0	4, 20	12	17
III.		Hitchen	·63	— 1·54	·21	6	11	55·0	8	21·0	4	20	...
,,		Banbury	·80	— 1·40	·37	6	9	57·0	8, 9	26·0	18	18	...
IV.		Bury St. Edmunds (Culford)	·42	— 1·78	·13	6	8	60·0	8	23·0	4,17	18	22
V.		Bridport	·70	— 2·17	·20	5, 16	5	57·0	31	24·0	21	10	..
,,		Barnstaple	1·23	— 1·92	·60	7	8	57·0	9	29·0	21	...	...
,,		Bodmin	1·83	— 1·92	·72	5	12	55·0	24	30·0	21	5	12
VI.		Cirencester	1·07	— 1·53	·37	5	5	...	...	...	...	...	...
,,		Shifnal (Haughton Hall)	·72	— 1·22	·22	7	10	57·0	7	26·0	20§	11	16
,,		Tenbury (Orleton)	·90	— 1·44	·29	5	11	60·0	31	25·0	21	13	17
VII.		Leicester (Belmont Villas)	·64	...	·21	6	9	57·0	31	26·0	5	...	...
,,		Boston	·43	— 1·36	·20	6	7	57·0	7, 8	30·0	20	7	...
,,		Grimsby (Killingholme)	·68	...	·28	6	12	56·0	8	29·5	5	3	...
,,		Derby	...	...	...	...	...	...	...	...	...	...	...
VIII.		Manchester	·82	— 1·87	·22	7	11	60·0	8	27·0	20	13	21
IX.		York	·55	— 1·44	·28	6	5	56·0	8	26·0	5	10	...
,,		Skipton (Arncliffe)	2·25	— 2·56	·67	6	12	...	...	...	...	...	...
X.		North Shields	·51	— 1·84	·16	8	9	54·3	26	31·0	20§	6	12
,,		Borrowdale (Seathwaite)	5·66	— 7·74	1·70	25	9	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)	1·59	— 1·36	·95	6	6	...	...	...	...	...	...
,,		Haverfordwest	1·64	— 1·81	·60	6	8	54·2	24	28·0	17	8	14
,,		Rhayader (Cefnfaes)	...	...	..	...	...	...	...	...	...	..	...
,,		Llandudno	·89	— 1·37	·21	25	9	56·6	8	30·9	20	1	...
XII.		Dumfries (Crichton Asylum)	1·43	— 1·55	·45	7	8	55·0	27	25·0	20	16	19
,,		Hawick (Silverbut Hall)	1·21	...	·54	8	7	...	...	...	...	...	...
XIV.		Kilmarnock (Annanhill)	1·41	...	·79	8	9	55·6	24	22·8	20	13	17
XV.		Castle Toward	2·27	— 2·32	1·05	9	8	56·0	30	...	...	14	...
XVI.		Leven (Nookton)	1·58	— ·49	1·15	8	10	60·0	30	27·0	20	11	22
,,		Stirling (Deanston)	...	...	...	...	...	...	...	...	...	...	...
,,		Grandtully	...	...	...	...	...	...	...	..	...	...	...
XVII.	SCOTLAND.	Braemar	1·34	— ·87	·53	9	11	52·2	23	15·0	5	19	26
,,		Aberdeen	2·52	...	1·42	8	13	58·2	8, 30	29·8	16	2	13
XVIII		Loch Broom	2·72	...	·48	21	17	...	...	...	...	...	..
,,		Portree	3·73	— 6·31	1·08	8	16	...	...	...	...	...	...
,,		Inverness (Culloden)	1·78	— ·18	1·18	9	13	53 1	31	23·3	4	11	22
XIX.		Helmsdale	1·33	...	·41	8	12	...	...	...	...	...	...
,,		Sandwick	·83	— 2·50	·16	26	14	51·0	24	31·8	4	1	9
XX.		Caherciveen Darrynane Abbey	2·35	...	1·00	5	8	...	...	...	...	...	...
,,		Cork	1·22	...	·46	5	8	...	...	...	...	...	...
,,		Waterford	1·31	— 1·58	·45	5	10	56·0	19*	33·0	1, 21	...	...
,,		Killaloe	1·34	— 2·98	·32	8	13	60·0	24	29·0	20	1	...
XXI.		Portarlington	1·32	— 1·99	·27	7	24	55·5	24	31·0	16	8	...
,,		Monkstown, Dublin	1·08	— 1·50	·69	5	5	...	...	...	...	...	...
XXII.		Galway	1·20	...	·31	8	9	57·0	15†	31·0	1	5	...
,,		Ballyshannon	1·15	...	·47	7	9	...	..	...	...	..	...
XXIII		Waringstown	·93	...	·20	8	15	59·0	7	25·0	19	6	14
,,		Edenfel (Omagh)	1·40	...	·55	8	18	52·0	7‡	28·0	9	13	...

* And 30. † 22, 24, 31. ‡ 24 & 25. § 21.

+Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON MARCH.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

LINTON PARK.—First week wintry, the ground covered with S for several days; but cold, dull, dry weather set in on 9th, and continued with but very little change to the end, the winds (never very high) being mostly N. and N.E., and bar. generally high. A fine month for the husbandmen and, in fact, all out-door work; but the prevalence of cold winds is telling on delicate people, and vegetation is backward, but not more so than has been the case in some favourable seasons.

SELBORNE.—Prevailing winds N. and N.E.; very dry and bleak; fog, more or less, on 22 days; dense on 15th. Bar. mean of month, 30·01; temp. mean max. of month 45°·6; mean min. 34°·3. Colds in various forms almost universal. Fine time for the Lent sowing.

BANBURY.—Ball S on 1st and 2nd; high wind on 8th; sleet on 12th; R and S on 18th.

CULFORD.—A very cold, dry month, the mean temp. under that of January, viz., 40° to 41°·7. The rainfall less than half-an-inch; it rained only on eight days, during four of which S also fell. Easterly winds prevailed on sixteen days. Vegetation of all kinds very backward.

BRIDPORT.—A very fine, dry month, almost unprecedented for the small amount of R, and noted particularly for the prevalence of N.E. wind.

BODMIN.—Mean bar., 30·07; mean temp., 44°·6, being the exact average for Bodmin. Rainfall 1·65 in. below the average (26 years).

HAUGHTON HALL.—The driest March since 1854, and an unusually cold spring; the frost with which February closed lasted nightly to the 6th, when a mild interval occurred for four days, after which frosts occurred at night with little intermission to the close. The R that fell was so trifling that it did no good to the pastures, and owing to the scanty crop of hay last year, followed by a partial crop of turnips, hay rose to £7 or £8 per ton. The winds, except in the mild interval mentioned, came persistently from N.E. and E. till 16th, when they changed to N. and N.W. to the close. The bar. was equable, never falling much even during the Equinox. A gale from S.W. on night of 8th. Coltsfoot in flower on 9th, celandine on 25th, apricots not until 31st; rooks building on 10th, ring dove cooing on 16th, first humble bee on 24th.

ORLETON.—The sky was generally covered with cloud and the sun rarely visible during the month. With the exception of a few days about the 8th, the temp. was very low with a cold wind from the N. or E., and the ground frequently covered with a light coat of S till the 22nd, when it became warmer and continued so to the end of the month. The mean temp. was about 1½° below the average of the month; the fall of R was small, and the weather favourable for farming operations. On the 9th there was a strong wind with a high bar., and on the 18th the bar. rose to 30·41 uncorrected.

LEICESTER.—Very dry month; wind generally N. or N.E.

BOSTON.—Very strong gale and very high tide on the 9th; the temp. fell from 49° to 32°, and the bar. rose from 29·70 to 30·40 between the 9th and 10th. The month generally cold and dull, with scarcely any sunshine, although the mean temp. was about the same as that of March in the previous ten years. The prevailing winds have been from the N. and E., blowing from that quarter more than double the usual number of days. Rainfall 1·09 in. below the average of the last 20 years.

GRIMSBY.—A very cold month (a few days excepted) although the ther. was not often below freezing point; sky overcast; high bar., and rainfall very small, the fall of the last three months only 3·44. Rooks began to build on 4th; frogs spawning on 19th; yews shedding pollen on 8th; pilewort began to flower on 10th; the old moon in the arms of the new moon on 10th.

MANCHESTER.—A very dry month.

WALES.

HAVERFORDWEST.—The cold of February followed by the strong easterly winds of the present month, have almost neutralized the heavy rainfall of the previous four months, which exceeded 30 inches; the ponds and rivers are sensibly diminished. If the next month does not make up the deficiency, we shall suffer from drought. Last year's hay harvest was a total failure; at present hay is £8 per ton. The month has been dry, frosty and cold, E. winds generally prevailing: a very fine seed time, but a time of great mortality.

LLANDUDNO.—On the 4th, the sun struggled out for a few minutes, about 4 p.m., it had not been seen here during the previous ten days; snow on the distant hills on the 5th, several snow showers on the morning of the 13th, and severely cold on the first three days, otherwise a fine dry seasonable month, only one frosty night and nine days on which it rained.

SCOTLAND.

DUMFRIES.—Gale from S.W. on 7th; month dry and cold, E. and N. winds prevalent; in the first part of the month the mornings were often frosty; no violent gale; temp. 2° higher than that of February, but 6° lower than March last year.

HAWICK.—A cold and very ungenial month.

ANNANHILL.—Bar. high, reaching 30·639 on the 17th; mean pressure of the month 30·214, remarkable depression on 9th, 28·991, a great storm and heavy rain. Mean temp. 2°·2 above that of last month, slight rainfall, prevalent winds E.N.E. and E.S.E.; days generally cloudy, some of the evenings very bright; to 17th cold nipping winds, retarding vegetation of all kinds; after this date it was milder, allowing seed sowing to progress, and bringing out young foliage; death-rate during the month 39 per 1,000 of the population per annum; principal causes, consumption and bronchitis, number of fatalities being 78.

CASTLE TOWARD.—Weather very favourable for outdoor employment, the ground being in good order; both sowing corn and planting potatoes are finished in this locality; early planting of potatoes is considered likely to lessen the chance of disease. Some hard frosty mornings, temp. 24° on the 16th. Winds very piercing, generally E. Bar. high on 6th and 7th. Arran hill tops white with snow. Sheep and cattle healthy; and on the whole this month has been a favourable one.

BRAEMAR.—A month of severe, changeable weather. Lunar halo 15th.

ABERDEEN.—Notwithstanding the heavy fall of rain on the 6th, (·71) and 8th (1·42), the month was a very dry one. Mean temp. 41°·5 or 2°·1 above the mean of 18 years, the excess being entirely due to the warmth of the last ten days, the first three weeks of the month having been bleak and cold. Wind pressure below the average, but exceptionally frequent from N. and E.

LOCHBROOM.—This has been a much drier month than agreeable to the graziers; but on the whole it has been favourable to agricultural purposes, hence the culture of the soil is far advanced, and sowing began earlier than usual in this northern region.

PORTREE.—On the whole this month has been favourable for outdoor farm-work. Provender for cattle very scarce. This is the driest March since 1870. Slight fall of S on evening of 9th, and H and sleet on 18th, 20th, 27th, and 28th.

CULLODEN.—8th stormy N.E. wind; S on 5 days, the last being the 27th; L on 4th; solar and lunar halos on 15th.

SANDWICK.—This March has been drier than any one for the previous 19 years, and there have been only two drier during the whole period of observation, viz., 1852 and 1856, when the rainfall was, respectively, ·78 and ·34, this month it was ·83; so there has been no lack of "March dust," and the weather being mild, we have had a very favourable seed time. A flock of lapwings arrived here on 15th. Crocus in flower on 24th. Bar. steady and very high, being above 30 in. on 24 days.

IRELAND.

DARRYNANE.—A very fine dry month, with almost constant light E. and N.E.

winds; fresh gale from the S.E. on the 5th and forenoon of 6th, with very heavy rain (1·00) in the afternoon and night of 5th.

WATERFORD.—Great storm and sudden change of the weather on the 5th. Storm on 9th.

BALLYSHANNON.—The month has been one of unusual dryness. During the first part, cold piercing E. winds prevailed; the latter part was more mild and genial, and spring work is in an advanced state in this neighbourhood. The lake and river Erne have not been so low at this season for years.

WARINGSTOWN.—Cold and dry, very favourable for labour; but much sickness in consequence of harsh wind.

OMAGH.—Weather of the month cold, dry, and favourable as a seed time; but a late season as regards growth or vegetation.

POCKY CLOUD.

SIR,—As I have never carefully observed this cloud before, perhaps I may be excused if I send you a few lines about it as seen here January 27th, 1875. The morning was cloudy and mild, with vane at S.S.W.: the winter gnats were flying about. At 4.30 p.m. the sky in the S.W. was a dirty yellow up to the zenith; sun near horizon, low scud. At 4.30, in the S. and near the horizon were the dull yellow pocky clouds, their lowest edge being 10° of altitude. On the horizon beneath them lay dull yellow cumuli. They broke up in about 15 minutes. In the S.W., above the sun's place, lay black and golden clouds.

Snow fell on the 25th and 26th, and the 28th and 29th were gloomy, with rain.—Yours very truly,

JOSEPH GLEDHILL, F.R.A.S., &c.

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